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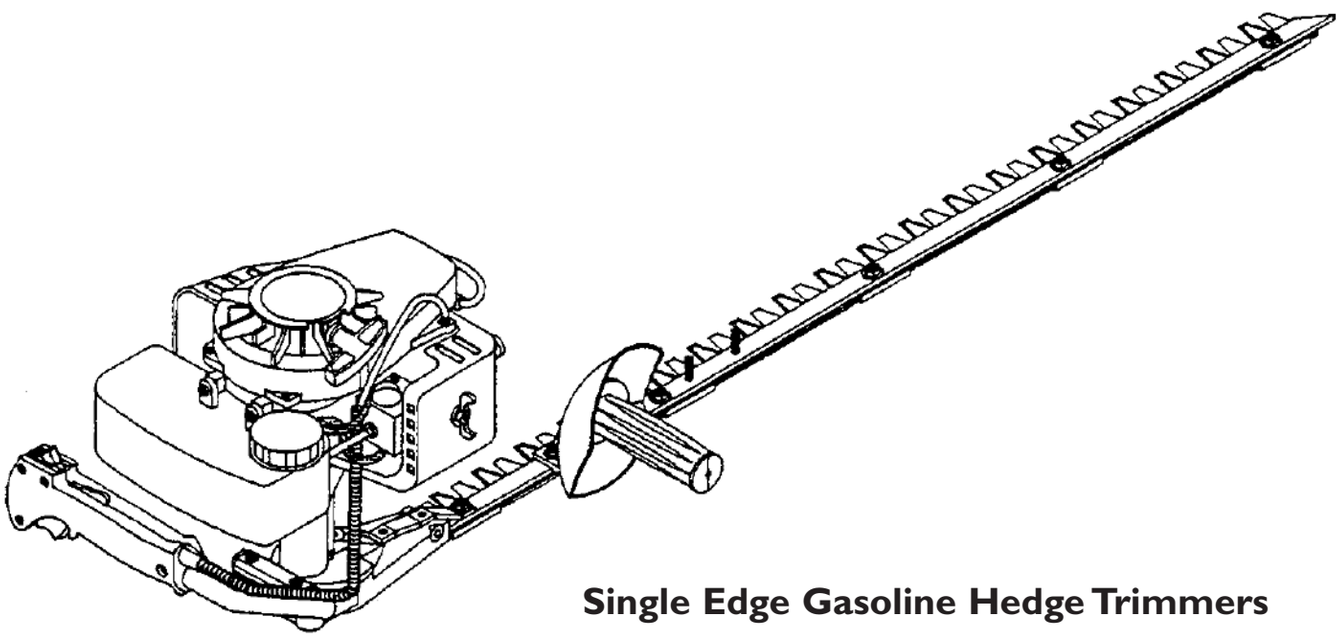
Gas Hedge Trimmer - Owner's Manual and Safety Instructions



Single Edge Gasoline Hedge Trimmers

Model SGHT30 30"

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Gas Hedge Trimmer -
Owner's Manual and Safety Instructions

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Important Information

A. Introduction

On behalf of everyone at ***Mantis***, we would like to thank you for your purchase of a ***Mantis*** Gasoline Powered Hedge Trimmer. This professional trimming machine was designed to the highest standards to ensure you many hours of uninterrupted service.

This manual provides the information necessary for safe and efficient operation and service. For your safety, it is critically important that you read and understand this entire manual before operating your hedge trimmer.

Weight Specifications

Model	SGHT30
Single Edge	x
Weight, Dry	12.25 lb.

B. Service Information

Cutter Bar
Contact ***Mantis*** at 800-366-6268.

Engine
Contact an authorized Echo dealer. Dealers are listed in the Yellow Pages under "Lawn and Garden Equipment Supplies", "Lawn Maintenance" or "Lawn Mowers".

C. Special Safety Information

⚠ WARNING - DANGER ⚠

ATTENTION: THIS SYMBOL POINTS OUT OUR IMPORTANT SAFETY INSTRUCTIONS

WHEN YOU SEE THIS SYMBOL HEED ITS WARNING! STAY ALERT!

⚠ WARNING - DANGER ⚠

TO REDUCE THE POTENTIAL FOR ACCIDENTS, COMPLY WITH THE SAFETY INSTRUCTIONS IN THIS MANUAL. FAILURE TO COMPLY MAY RESULT IN SERIOUS PERSONAL INJURY AND OR EQUIPMENT AND PROPERTY DAMAGE.

⚠ WARNING - DANGER ⚠

THE ENGINE EXHAUST FROM THIS PRODUCT CONTAINS CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER, BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

Safety and Warnings

⚠ WARNING - DANGER ⚠

IMPROPER USE OR CARE OF THIS TRIMMER, OR FAILURE TO WEAR PROPER PROTECTION CAN RESULT IN SERIOUS INJURY.

READ AND UNDERSTAND THE RULES FOR SAFE OPERATION AND ALL INSTRUCTIONS IN THIS MANUAL.

WEAR HEARING PROTECTION.

A. Safety Decals

An important part of the safety system incorporated in this trimmer are the warning and information decals found on various parts of the trimmer. These decals must be replaced in time due to abrasion, etc. It is your responsibility to replace the decals when they become hard to read. The location of these decals and their part numbers for ordering are shown below.

B. General Safety Rules

1. THIS MACHINE CAN CAUSE SERIOUS INJURIES. Read the instructions carefully for the correct handling, preparation, maintenance, starting and stopping of the machine. Be familiar with all controls and the proper use of the machine. Pay particular attention to all sections regarding safety.

WARNING!

WEAR EYE AND EAR PROTECTION

READ AND UNDERSTAND OWNER'S MANUAL BEFORE USING! KEEP IN SAFE PLACE!

CUTTING HAZARD! KEEP BOTH HANDS ON HANDLES AND AWAY FROM BLADES!

2. Always keep a firm grip on both handles while the blades are moving and/or the engine is running. On single edge units the right hand grasps the front side handle and the left hand grasps the rear handle. BE AWARE!! The blades coast after throttle trigger is released or engine is switched off. Make sure blades have come to a complete stop and engine is off before releasing a handle.

3. Maintain a firm footing and good balance, do not overreach while trimming. Before you start to trim, check the work area for obstacles that might cause you to lose your footing, balance or control of the machine. While operating the machine always be sure of a safe and secure operating position especially when using steps or a ladder.

4. Keep area clear of children, pets, and bystanders.

5. Blades coast after throttle trigger is released or engine is switched off.

6. Stop the engine before checking, maintenance or working on the machine.

7. Never operate without guards, handles and safety devices in place.

8. Never attempt to use an incomplete machine or one fitted with an unauthorized modification.

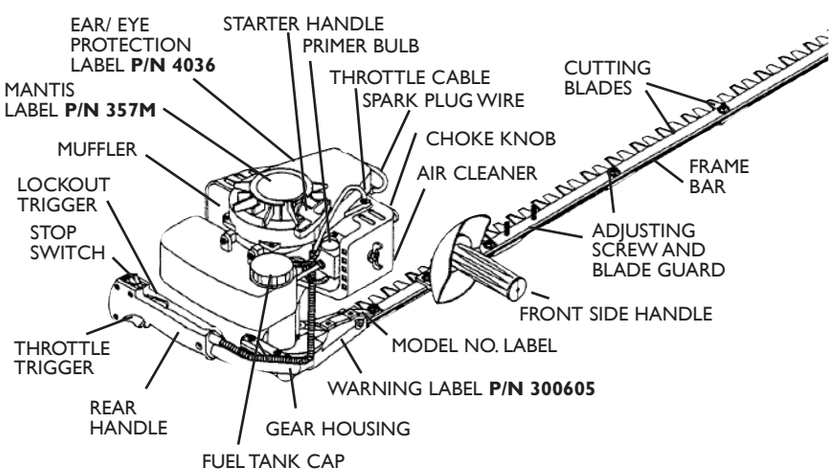
9. To reduce fire hazard, keep engine and silencer free of debris, leaves, or excessive lubricant.

10. Know how to stop the machine quickly in an emergency.

⚠ WARNING - DANGER ⚠

IF TRIMMER IS USED IMPROPERLY OR SAFETY PRECAUTIONS ARE NOT FOLLOWED. THE USER RISKS SERIOUS INJURY TO THEMSELVES AND OTHERS.

READ AND UNDERSTAND THE FOLLOWING BEFORE ATTEMPTING TO OPERATE THIS HEDGE TRIMMER



EMISSION CONTROL
The emission control system for the engine is EM/TWC (Engine Modification and 3-way Catalyst) and for the fuel tank the Control System is EVAP (Evaporative Emissions) or N (for nylon tank). Evaporative emission may be applicable to California models only.

EMISSION CONTROL INFORMATION
ENGINE FAMILY: EHXS.0454KA DISPLACEMENT: 45.0cc
EMISSION COMPLIANCE PERIOD = 300 HOURS
THIS ENGINE MEETS U.S. EPA EXH/EVP REGS FOR MODEL YEAR
REFER TO OWNER'S MANUAL FOR MAINTENANCE SPECIFICATIONS AND ADJUSTMENTS.
YAMABIKO CORP.

An Emission Control Label is located on the engine (This is an EXAMPLE ONLY, information on label varies by engine FAMILY.)

C. Warnings - Don'ts

Don't use trimmer with one hand, keep both hands on handles with fingers and thumbs encircling the handles, while blades are moving, and engine is running.

Don't overreach or stand on unstable support. Do not stand on the top of a ladder while trimming. Use proper equipment for reaching higher heights. Keep a good footing at all times.

Don't ever grasp cutting blades for any reason.

Don't operate the machine with a damaged or excessively worn cutting device.

Don't attempt to clear cut material while blades are moving, and the engine is running. Never try to remove jammed material before switching the engine off and making sure the blades have stopped completely.

Don't override safety features.

Don't allow children or incapable people to operate this trimmer.

Don't operate this hedge trimmer while under the influence of alcohol or drugs.

Don't attempt to repair this hedge trimmer. Have repairs made by ***Mantis***. See that only original ***Mantis*** parts are used.

D. Warnings - Do's

Always read and follow all instructions.

Always stay alert. Watch what you are doing and use common sense. Do not operate unit when fatigued.

Always dress properly. Do not wear loose clothing or jewelry, they might get caught in moving parts. Use sturdy proper fitting, non-slip gloves. Gloves reduce the transmission of vibration to your hands. Prolonged exposure to vibration can cause numbness and other ailments. Wear non-skid foot wear to ensure secure and proper footing.

Always wear ear and eye protection. Eye protection must meet ANSI Z 87.1. To avoid hearing damage we recommend hearing protection be worn whenever using the equipment.

Always keep both hands on both handles when trimmer is running. Severe injuries can result if you try to use the hedge trimmer with only one hand or with an insecure grip.

Always keep children, pets, and incapable persons away.

Always use trimmer properly. Cut only types and size of growth described in the Trimming section of this manual. Overloading or abusing your hedge trimmer can cause premature failure and can result in injury. Use common sense.

Always keep a safe distance between two or more operators when working together simultaneously.

Always inspect your unit before each use and ensure that all handles, guards, safety devices and fasteners are secure, operating, and in place.

Always maintain and examine your trimmer with care. Follow maintenance instructions given in manual.

Always store trimmer in a sheltered area (a dry place) not accessible to children. The hedge trimmer as well as fuel should not be stored in a house.

Always be aware of your surroundings and stay alert for possible hazards that you may not hear due to the noise of the machine.

WARNING - DANGER

IF TRIMMER IS USED IMPROPERLY OR SAFETY PRECAUTIONS ARE NOT FOLLOWED, THE USER RISKS SERIOUS INJURY TO THEMSELVES AND OTHERS.

READ AND UNDERSTAND THE FOLLOWING BEFORE ATTEMPTING TO OPERATE THIS HEDGE TRIMMER.

WARNING - DANGER

HANDLE FUEL WITH CARE. IT IS HIGHLY FLAMMABLE. FUELING A HOT ENGINE OR NEAR AN IGNITION SOURCE CAN CAUSE A FIRE AND RESULT IN SERIOUS PERSONAL INJURY AND/ OR PROPERTY DAMAGE.

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E. Engine/ Fuel Warnings - Don'ts

Don't fuel, refuel or check fuel while smoking or near an open flame or other ignition source. Stop engine and be sure it is cool before refueling.

Don't leave the engine running while the trimmer is unattended. Stop engine before putting the trimmer down or while transporting from one place to another.

Don't start, run this trimmer indoors, or in an improperly ventilated area as poisonous carbon monoxide and other gasses are emitted.

Don't run engine when electrical system causes spark outside the cylinder. During periodical checks of the spark plug, keep plug a safe distance from cylinder to avoid burning of evaporated fuel from cylinder.

Don't check for spark with spark plug or plug wire removed and grounded. Use an approved tester. Sparks can ignite fumes.

Don't crank engine with spark plug removed. If the engine is flooded, open the choke (push choke knob in) and pull recoil until engine starts. If this fails read and follow "Starting a Flodded Engine" on page 8 of this manual.

Don't run engine when the odor of gasoline is present or other explosive conditions exist.

Don't operate the unit if gasoline is spilled. Clean up spill completely before starting engine.

Don't refuel indoors or in an improperly ventilated area.

Don't operate your trimmer if there is an accumulation of debris around the muffler, and cooling fins.

Don't touch hot mufflers, cylinders or cooling fins as contact may cause serious burns.

F. Engine/ Fuel Warnings - Do's

Always use fresh gasoline in the fuel mixture. Stale gasoline can cause leakage.

Always pull starter cord slowly until resistance is felt. Then pull cord rapidly to avoid kickback and prevent arm or hand injury.

Always operate engine with spark arrestor installed and operating properly. The use of spark arrestor mufflers is required by law in the state of California (Section 4442 of the California Public Resources Code), as well as in other states or municipalities. Federal laws apply on federal lands.

This spark ignition system meets all requirements of Canadian Interference-causing Equipment Regulations.

Always handle fuel with care; it is highly flammable. Never add fuel to a machine with a running or hot engine. Do not inhale fuel fumes as they are toxic.

Assembly Instructions

WARNING - DANGER

BLADES ARE EXTREMELY SHARP! TO AVOID INJURY WHEN UNPACKING THE HEDGE TRIMMER, DO NOT GRASP THE BLADES.

WARNING - DANGER

IMPROPER ASSEMBLY OF THIS TRIMMER CAN RESULT IN SERIOUS INJURY. MAKE SURE TO FOLLOW ALL INSTRUCTIONS CAREFULLY.

IF YOU HAVE ANY QUESTIONS, CONTACT OUR FACTORY AT 800-366-6268.

Your ***Mantis*** hedge trimmer has been assembled for you at the factory. Before operating be sure all fasteners are secure, and all guards and safety devices are in place and operating properly.

A. Single Edge Models

1. Remove the cutter bar assembly, the engine with handle and throttle assembly, the side handle, and hardware bag from their boxes.

2. Place the front side handle over the two 1/4-28 studs protruding from the frame bar in front of the gear housing. The handle grip **must** be pointing away from the cutting blades as illustrated (Figure 1). On Model SGHT30 use the set of studs which places the handle in the most comfortable position for you. Place the thread protectors over the set of studs that you choose not to use at this time to protect the threads. Secure the handle in place using two 1/4-28 flange locking nuts provided. The nuts should be tightened enough to keep the handle from moving but not so tight as to crush the plastic.

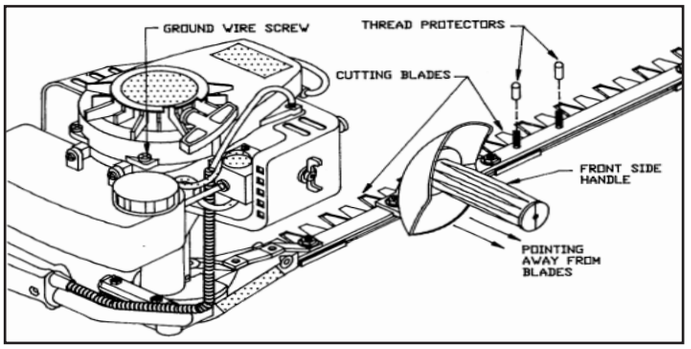


Figure 1

If the engine needs to be reinstalled:

1. Install the engine by first aligning the hex drive on the trimmer gear housing with the single sided hex socket in the engine.

2. Slide the engine over the 1" diameter stem containing the hex drive on the gear housing until it is seated all the way down on the gear housing. Tighten the bolt (Pg. 17, Item D17).

3. Press shock absorbers into sockets on the gear housing followed by the spacer tubes. Secure the handle and tubing support channel, spacer, and bracket with the 1/4-20 hex bolts and locking nuts supplied.

4. With the stop switch in the stop position, and the engine not running, check the throttle for proper operation. Grasp rear handle with left hand, depressing the lockout trigger until it stops when the carburetor lever hits the carburetor case. Release the throttle trigger and make sure the throttle returns to the idle position, when the carburetor level rests on the idle screw. Throttle movement should be smooth and unobstructed.

B. Break-In Procedure

There are no special requirements for engine break-in. After normal operation and two (2) tanks of fuel, engine break-in is complete.

If adjustments are necessary, follow Special Carburetor Adjustment Procedures on this supplementary Operator's Information Sheet. All other adjustments and maintenance procedures are in the complete Owner's Manual.

Operation

⚠ WARNING - DANGER ⚠

THE OPERATOR OF THIS HEDGE TRIMMER IS RESPONSIBLE FOR ACCIDENTS OR HAZARDS OCCURRING TO HIMSELF, OTHER PEOPLE OR THEIR PROPERTY.

⚠ WARNING - DANGER ⚠

FUEL IS EXTREMELY FLAMMABLE. HANDLE IT WITH CARE. KEEP AWAY FROM IGNITION SOURCES. DO NOT SMOKE WHILE FUELING YOUR EQUIPMENT.

A. Fuel Mixture

Your ***Mantis*** Single Edge Hedge Trimmer is powered by an Echo Model SV-5H/2. This model has a two stroke, air cooled engine which requires a fuel mixture of gasoline and 2-stroke oil.

1. Important Engine Information

This unit is certified to operate on approved two-stroke fuel (a mixture of 2-stroke oil and gasoline/ gasohol).

2. Fuel Statement

Gasoline - Use 89 Octane [R+M/2] gasoline or gasohol known to be good quality. Gasohol may contain up to 10% Ethanol (grain alcohol) or 15% MTBE (methyl tertiary-butyl ether). Gasohol containing methanol (wood alcohol) is NOT approved.

3. Two-Stroke Oil

A two-stroke engine oil meeting proposed ISO-L-EGD Standard (ISO/CD 13738), must be used. ***Mantis*** brand Premium 50:1 oil meets this proposed standard. Engine problems due to inadequate lubrication caused by failure to use an ISO-L-EGD approved oil, such as ***Mantis*** Premium 50:1 Two-stroke Oil, **will void the two-stroke engine warranty**. (Emission related parts only are covered for two years, regardless of two-stroke oil used, per the statement listed in the EPA California Emission Defect Warranty Explanation.)

B. Mixing Fuel

1. Pour 1/2 of the gasoline into a safe container. **DO NOT** mix fuel in the engine fuel tank.

2. Add the oil to the gasoline and mix.

3. Add the remaining gasoline and remix.

4. Install fuel cap and wipe spilled fuel from container and area.

5. **Important,** two stroke fuel separates and ages. Do not mix more than you will use in a month. Shake fuel container to thoroughly mix fuel before each use. Do not attempt to run your engine on gasoline only, use the proper fuel mixture.

C. Starting a Cold Engine

The trimmer has a Start/Stop ignition switch which must be used for starting and stopping the engine.

1. Place the hedge trimmer flat on the ground, or another stable surface. Slide the ignition switch to the START position.

2. Pull choke knob out to COLD START (closed) position.

3. Push primer bulb 3 to 4 times, or until fuel is visible in the clear fuel return line.

4. Pull starter rope until engine sputters. Use short pulls, 1/2 to 2/3 of the rope length.

⚠ WARNING - DANGER ⚠

AVOID ACCIDENTAL BLADE ENGAGEMENT.

DO NOT SQUEEZE TRIGGER WHEN STARTING.

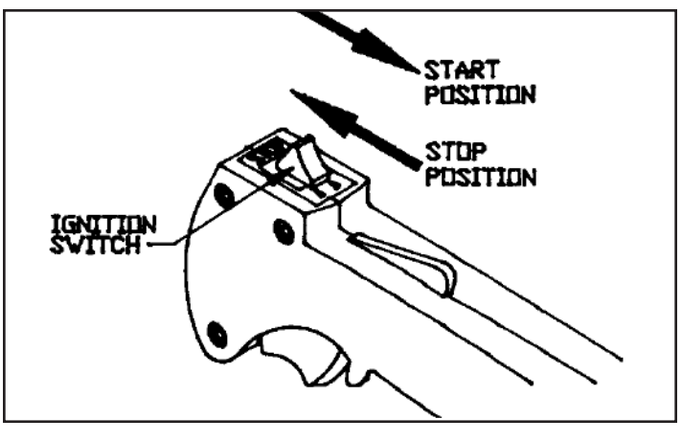
MAINTAIN ENGINE'S PROPER IDLE SPEED ADJUSTMENT (2500 - 2700 RPM)
MAX FULL THROTTLE ENGINE SPEED IS 10,500 - 11,000 RPM

5. Push choke knob in to the RUN position.

6. Restart engine and allow it to warm up for 2-3 minutes.

7. With both hands on the handles, squeeze throttle trigger gradually, to increase the engine speed and engage the blades.

NOTE: Allow engine to warm up 2-3 minutes before use. Failure to do so will cause engine damage.



Single Edge Trimmer

D. Starting a Warm Engine

1. Slide ignition switch to START position.

2. Push choke knob in to RUN (open) position.

3. If there is no fuel in the clear return line, push primer bulb 3-4 times or until fuel is visible in the line.

4. Pull starter rope using short pulls, 1/2 to 2/3 of the rope length.

5. If engine fails to start in 4 pulls, use cold start procedure.

6. With both hands on the handles, squeeze throttle trigger gradually to increase the engine speed and engage the blades.

E. Starting a Flooded Engine

1. Remove the cap from the spark plug and unscrew the plug with a spark plug wrench. If the end of the spark plug is wet, the engine may be flooded.

2. Use a paper towel or clean rag to dry the end of the spark plug.

3. Reinstall the spark plug and cap.

4. Push the choke knob in (open position) and pull starter rope three to four times.

5. Now pull the choke knob out (closed position) and pull the starter rope until the engine sputters.

6. Finally, push the choke knob in (open position) and pull the starter rope to start the engine

F. Stopping the Engine

1. Release the throttle trigger and allow engine to idle.

2. Slide ignition switch to the STOP position.

3. Make sure blades have come to a complete stop before releasing either handle.

⚠ WARNING - DANGER ⚠

IF ENGINE DOES NOT STOP WHEN SWITCH IS PUT IN THE STOP POSITION, RELEASE THE THROTTLE TRIGGER, ALLOW ENGINE TO IDLE.

PUT THE TRIMMER DOWN, AND PULL THE CHOKE KNOB OUT TO COLD STOP, (CLOSED) POSITION.

Maintenance

G. Trimming

⚠ WARNING - DANGER ⚠

BLADES COAST AFTER RELEASING THROTTLE OR STOPPING ENGINE.

KEEP A FIRM GRIP WITH BOTH HANDS WHILE BLADES ARE MOVING AND/ OR ENGINE IS RUNNING.

DO NOT STAND ON THE TOP OF A LADDER WHILE TRIMMING.

MAKE SURE YOUR LADDER OR OTHER SUPPORT IS STABLE AND ON FIRM GROUND.

KEEP A SURE FOOTING. DO NOT OVERREACH.

IF YOUR TRIMMER BECOMES JAMMED, RELEASE THROTTLE AND STOP ENGINE. MAKE SURE BLADES HAVE STOPPED COMPLETELY, THEN REMOVE THE OBSTRUCTION.

1. **WARNING!** Read and follow all safety instructions in the manual before attempting to use this trimmer.

2. Only after you are familiar with your hedge trimmer and all of its controls and the functions should you start the engine.

3. Once the engine is started grasp the handles securely, the left hand should grasp the rear handle and the right hand should grasp the front side handle on single edge trimmers.

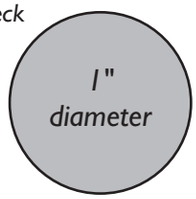
4. Squeeze the throttle to accelerate the engine and engage the blades.

5. Tilt the trimmer so the cutting teeth are angled slightly toward the hedge or shrub and proceed to cut. Use overlapping sweeping motions away from your body to achieve a safe and even cut.

6. This unit is designed to cut any type of hedge or shrub; however,

THICKNESS OF CUT SHOULD NOT EXCEED 1 INCH IN DIAMETER.

Misuse of this Hedge Trimmer will void the warranty. ie: Cutting hedges or shrubs over 1" in diameter or foreign objects such as wires, rocks, or fences. Before trimming check work area for foreign objects such as wires, cords, glass, fences, or rocks. Be sure to remove any foreign objects from the work area. Failure to properly maintain this hedge trimmer will void the warranty.



A. Lubrication

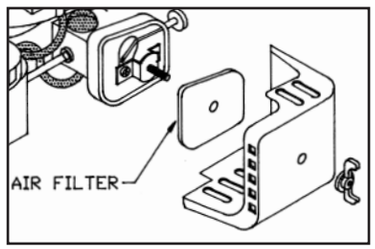
1. A few drops of a light #10 oil should be placed on the back edge of each blade guard at each adjusting screw approximately after every 4 hours of normal operation.

2. To obtain trouble free trimming, it is necessary to keep the blades lubricated and clean. The gum that collects and builds up on the blades can be removed with a 50-50 mixture of kerosene and #10 oil. As petroleum products can shorten the life of some plastics it is necessary to remove excess oil-kerosene mixture from the plastic parts.

3. When blades are replaced, or any other time that the bottom cover plate is removed, the grease level should be checked for proper amount (approximately 3/4 full in the area of the gears) and a new gasket (P/N319) should be used to insure proper seating of the cover plate. Grease level should be checked and adjusted after every 50 hours of use. Use only Lubrico M3-3K-9K grease in the gear housing.

B. Engine

1. Air Filter



a. Clean the air filter before each use. Remove wing nut and air filter cover.

b. If filter is excessively dirty or no longer fits properly, replace it.

c. Re-install filter to inside cover making sure it is seated properly.

d. Re-install cover onto air cleaner case and secure with wing nut.

2. Cooling Fins

Remove dirt and debris from around cooling fins and exhaust before each use. Proper air circulation is essential for engine performance and life.

C. Long Term Storage (over 60 days)

1. Store your trimmer in a dry and dust free space, out of the reach of children.

2. Place the ignition switch in the stop position.

3. Clean the engine and blades thoroughly and coat the blades with #10 oil to prevent rust.

4. Perform all required maintenance and service found in this manual.

5. Drain the fuel tank and pull the starter rope several times to remove the fuel from the carburetor.

6. Remove the spark plug and pour 1/4 oz. of fresh, clean, two-stroke engine oil into the cylinder via the spark plug hole. Cover the hole with a rag and pull the starter rope 2-3 times.

7. While looking through the spark plug hole pull the starter rope until the piston reaches the top of its stroke and stop.

8. Install the spark plug, but leave the ignition cable disconnected.

⚠ WARNING - DANGER ⚠

DO NOT STORE IN AN AREA WHERE FUEL FUMES MAY ACCUMULATE AND REACH A FLAME OR SPARK.

Service

A. Troubleshooting

Problem	Cause	Remedy
1. Blades don't cut cleanly.	Blades are dull or not adjusted properly.	Have blades sharpened and adjusted.
2. Blades don't move when throttle is depressed.	Engine is not seated properly on the gear housing. Blades are adjusted too tight.	Re-install engine following the assembly instructions. (pg. 7) Re-adjust blades following service instructions. (pg. 11)
3. Engine fails to start	ON/OFF switch is in OFF position. No fuel in tank. Fuel strainer clogged. Fuel line clogged. Spark plug shorted or fouled. Spark plug is broken (cracked porcelain or electrodes broken). Ignition lead wire shorted, broken or disconnected from spark plug. Ignition inoperative (no spark from lead wire).	Move switch to ON. Fill Tank. Replace Strainer. Clean fuel line. Install new sparkplug. Replace sparkplug. Replace lead wire or attach to sparkplug. Contact ***Mantis***.
4. Engine hard to start.	Water in gasoline or stale fuel mixture. Too much oil in fuel mixture. Engine under or over choked. Carburetor out of adjustment. Gasket leaks (carburetor or cylinder base gasket).	Drain entire system and refill with fresh fuel. Drain and refill with correct mixture. If flooded by over choking, proceed according to instructions in operation section. If under choked, move choke lever to closed position and crank two or three times. See "Carburetor Adjustment" Replace gaskets. (pg. 12) Contact ***Mantis***. Remove and clean. See "Carburetor Adjustment". (pg. 10) Clean or replace spark plug - set gap to 0.6-0.7 mm (.024 .028in.).
5. Engine misses.	Weak spark at sparkplug	Contact ***Mantis***.
6. Engine lacks power.	Air cleaner clogged. Carburetor out of adjustment. Muffler clogged. Clogged exhaust ports. Clogged spark arrestor Poor compression.	Clean air cleaner. See "Carburetor Adjustment". Clean carbon from muffler. Remove muffler, rotate engine until the piston is at top of cylinder. With a wooden scraper or blunt tool, remove all carbon from exhaust ports. Be careful not to scratch or damage piston or cylinder walls. Blow out all loose carbon with compressed air. Install muffler and gasket. Clean Contact ***Mantis***.
7. Engine overheats.	Insufficient oil in fuel mixture. Air flow obstructed.	Mix fuel as described in starting instructions. Clean flywheel, cylinder fins and screen.
8. Engine noisy or knocking.	Loose flywheel. Spark plugs incorrect heat range. Worn bearings, piston ring or cylinder walls.	Tighten flywheel nut. Replace with plugs specified for engine. Contact ***Mantis***.
9. Engine stalls under load.	Carburetor adjustment too "lean". Engine overheats.	See "Carburetor Adjustment". Remove dust and dirt from between cylinder fins.

B. Engine Specifications

Dry Weight	2.5 kg — 5 lbs., 10 ounces	Fuel	Premixed two stroke fuel
Type of Engine	Air Cooled, Two stroke, Single-Cylinder, Gasoline Engine	Fuel Oil Ratio	50:1 ratio with ECHO or ***Mantis*** oil
Rotation	Counterclockwise, viewed from TOP	Gasoline	Unleaded, 89 octane or higher
Bore	32.2 mm (1.268 in.)	Displacement	21.2 cc (1.294 cu. in.)
Stroke	26.0 mm (1.04 in.)	Exhaust System	Spark arrester muffler
Spark Plug	NGK BPM7Y, Champion RCJ-7Y or RCJ-8Y The spark plug gap is 0.65 mm (0.026"). Refer to Owner's Manual, for service Procedure	Carburetor	ZAMA diaphragm model C1U type. RPM at idle 2800 ± 250 RPM
		Ignition System	There are no adjustments required for the ignition

C. Service Maintenance Guide

This chart shows necessary EPA emission maintenance information for fuel tanks/systems and Exhaust Port Cleaning intervals.

COMPONENT/ SYSTEM	MAINTENANCE PROCEDURE	REQ'D SKILL LEVEL	DAILY OR BEFORE USE	EVERY REFUEL	3 MONTHS OR 90 HOURS	YEARLY 600 HOURS
Air Filter	Inspect/Clean	1	I/C*			
Choke Shutter	Inspect/Clean	1	I/C			
Fuel Filter	Inspect	1			I*	I/R*
Fuel Cap Gasket	Inspect/Replace	1			I*	R*
Fuel System	Inspect/Replace	1	I(2)*	I(2)*		
Spark Plug	Inspect/Clean	1			I/C/R*	
Cooling System	Inspect/Clean	2	I/C			
Muffler Spark Arrestor	Inspect/Clean/Replace	2			I/C/R*	
Cylinder Exhaust Port	Inspect/Clean/Decarbon	2			I/C	
Gear Housing	Grease	2			I(1)	
Recoil Starter Rope	Inspect/Clean	1	I/C*			
Screws/Nuts/Bolts	Inspect/Tighten/Replace	1	I*			

MAINTENANCE PROCEDURE LETTER CODES: I = INSPECT, R = REPLACE, C = CLEAN

IMPORTANT NOTE - Time intervals shown are maximum. Actual use and your experience will determine the frequency of required maintenance.

MAINTENANCE PROCEDURE NOTES:

(1) Apply "0" or "00" EP Grease every 25 hours of use.

(2) Low evaporative fuel tanks DO NOT require regular maintenance to maintain emission integrity.

* Replacement is recommended based on the finding of damage or wear during inspection.

† Replacement will be required for commercial use after 600 hours. For customer use, cleaning every six months is required. Cleaning includes rebuild kits.

IMPORTANT: Time intervals shown are maximum. Actual use and your experience will determine the frequency of required maintenance.

D. Blade Adjustment

The care and adjustment of the blades is very important to the efficient operation of the trimmer and especially to the long life of the engine.

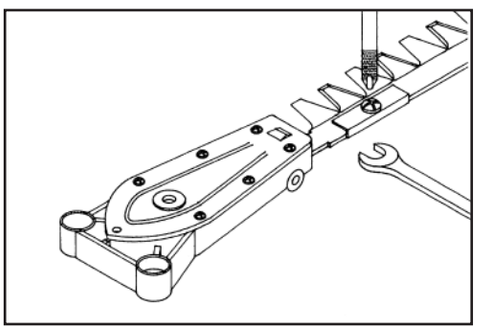
1. Place trimmer in vise, clamping on the frame bar. Be careful! Blades are sharp!

2. Using a 7/16" wrench, loosen all blade locknuts and unscrew the large head screws by two turns.

3. Starting with the screw nearest the gear housing, tighten the screw until the blade guard of the single edge trimmer can just be moved with finger pressure and a .0015" (1 1/2 thou.) feeler blade just slips under the blade guard. Tighten the locknuts while holding the screw stationary in its correct adjusted position.

4. Repeat Step 3 on the screws in turn until all are correctly adjusted.

NOTE: Correct blade adjustment can only be achieved on clean, oiled blades.



Single Edge

E. Carburetor Adjustment

1. General

NOTE: The diaphragm carburetor has three external adjustments. Each adjustment affects the others.

The idle speed adjustment screw controls the throttle opening at idle position.

The low (LO) speed adjustment screw controls the volume of fuel mixture at low engine speed. It also controls the supplementary fuel required to obtain smooth progression from idling to high speed.

The high (HI) speed adjustment screw controls the volume of fuel mixture at full throttle.

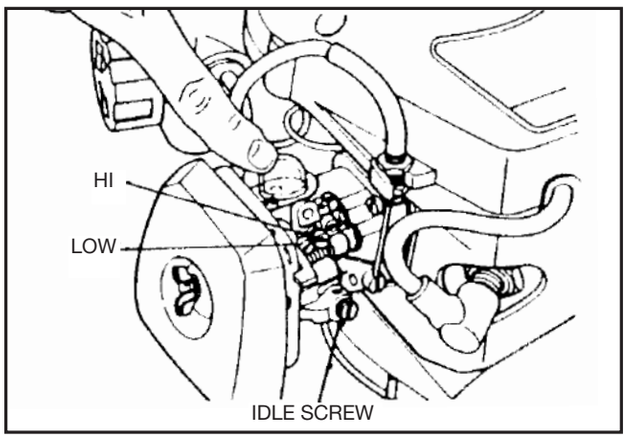
2. Carburetor Adjustment

Every unit is run at the factory and the carburetor is set in compliance with EPA California Emission Regulations. In addition, the carburetor is equipped with HI and LO needle adjustment limiters that prevent settings outside acceptable limits. Limiter caps must remain or be replaced on both the Hi and Lo carburetor adjusting screws. There is no limiter cap on the idle screw.

NOTE: The needle screws have a sharp point. To avoid damage to the carburetor, do not use excessive force.

a. Before adjusting carburetor clean or replace air filter and muffler, "Spark Arrestor Screen".

b. Make sure the cutting attachment such as hedge clipper blades are properly adjusted.



c. Start engine and run several minutes to bring to operating temperature. Flash choke twice during warm-up to clear any air from the fuel system.

NOTE: The Idle speed screws may have to be re-adjusted to keep engine from stalling. The Engine must be at normal operating temperature to adjust properly.

d. Stop engine. Turn HI speed needle counter-clockwise to stop. Turn LO speed needle midway between full clockwise stop and counter-clockwise stop.

e. Idle Speed Adjustment

Units with Cutting Attachments.
Turn "idle" speed adjustment screw CW (clockwise) until cutting attachment begins to turn, then turn screw out CCW (counter clockwise) until attachment stops turning. Turn screw out, CCW, an additional 1/4 turn.

f. Start unit and accelerate to full throttle for 2-3 seconds to clear any excess fuel in the engine, then return to idle. Accelerate engine to full throttle to check for smooth transition from idle to high speed. If engine hesitates turn LO needle CCW 1/8 turn and repeat acceleration. Continue adjustment until smooth acceleration results.

g. Check idle speed and reset if necessary as described in "item e" above. If a tachometer is available idle speed should be set as specified in the Owner's Manual.

Important: Do not run the engine at full throttle or with no load for more than 5-6 seconds to avoid engine damage.

Note: This hedge trimmer is equipped with a speed limiting carburetor (the high speed circuit has a by-pass system). With this feature the engine will continue to run even with the high speed adjusting screw turned all the way in. Although the engine will continue to run, it will only produce full power with the HI adjusting screw opened to about 3/8 to 1/2 turn.

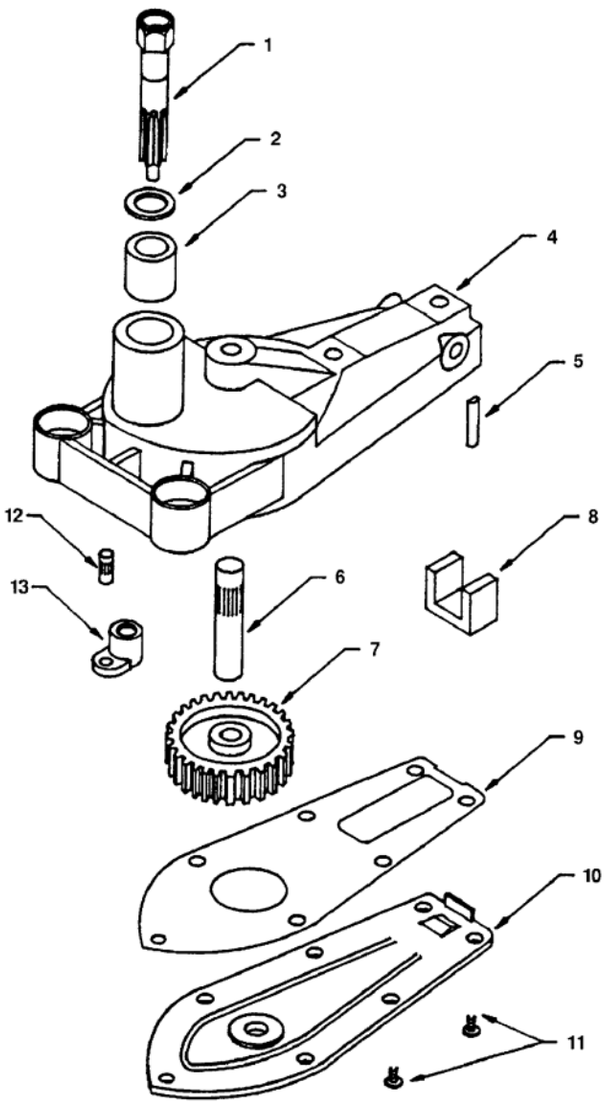
⚠ WARNING - DANGER ⚠

KEEP HANDS AWAY FROM THE BLADES WHILE SERVICING THE HEDGE TRIMMER. BE SURE TRIMMER IS SECURED AND BLADES ARE GUARDED WHILE MAKING ADJUSTMENTS.

F. Notes

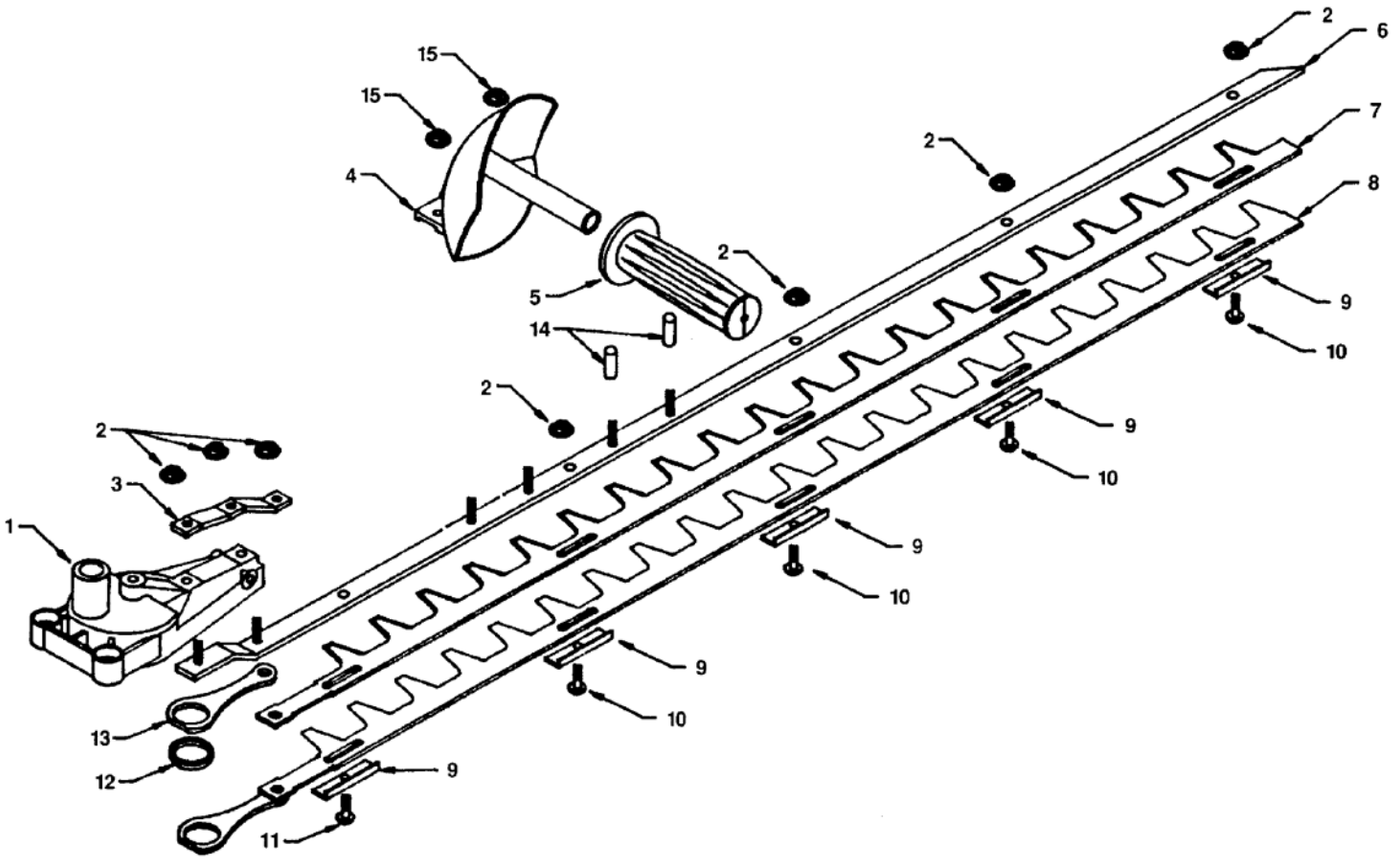
Parts Explosions

A. Gear Housing Assembly - Single Edge Hedge Trimmer



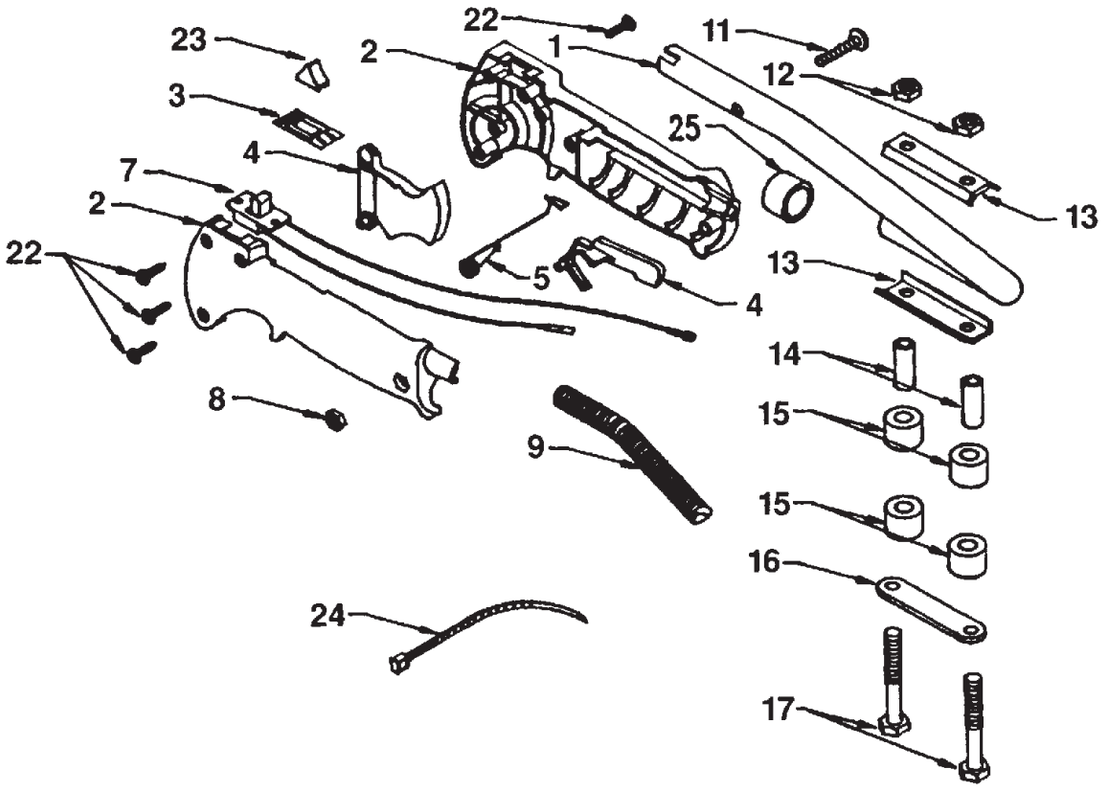
Key No.	Part No.	Description	Qty.
1	371	Pinion	1
2	375	Washer	1
3	374	Upper Bushing	1
4	300000	Gear Hsg Assem. (inc. Key No. 3, 6, 12)	1
5	D16-56F	Wear Plate	1
6	16-61	Eccentric Shaft	1
7	372	Eccentric Gear	1
8	314	Felt	1
9	319	Gasket	1
10	316	Cover Plate	1
11	16-81	6-32 x 5/16 Screw Pack	1
12	16-80	Cover Plate Pin	1
13	373	Lower Bushing	1

B. Cutting Bar and Side Handle Assembly - Single Edge Hedge Trimmer

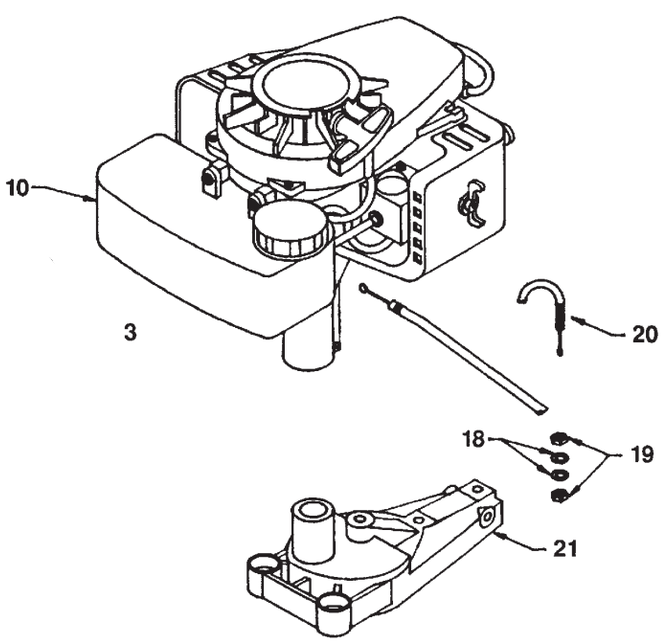


Key No.	Part No.	Description	Qty.
1	300000	Gear Housing Assembly	1
2	16-54B	1/4-28 Whiz Flange Locknut (For Model 2230S)	7
3	300300	Frame Bar Brace	1
4	300200	Side Handle	1
5	300201	Grip	1
6	300310	30" Frame Bar (For Model 2230S)	1
7	30-2	30" Inside Blade (For Model 2230S)	1
8	30-1	30" Outside Blade (For Model 2230S)	1
9	16-93	Blade Guard (For Model 2230S)	5
10	16-54A	Large Head Phillips Screw (For Model 2230S)	4
11	300504	Large Head Screw 1/4-28 x 7/8	1
12	16-65	Connecting Rod Spacer	1
13	16-64	Connecting Rod	1
14	300316	Thread Protector (For Model 2230S)	2
15	3036-B	1/4-28 Flange Locknut	2
17	16-51B	Drive Pin - Outside Blade	1
18	16-52B	Drive Pin - Inside Blade	1

C. Engine and Rear Handle Assembly - Single Edge Hedge Trimmer

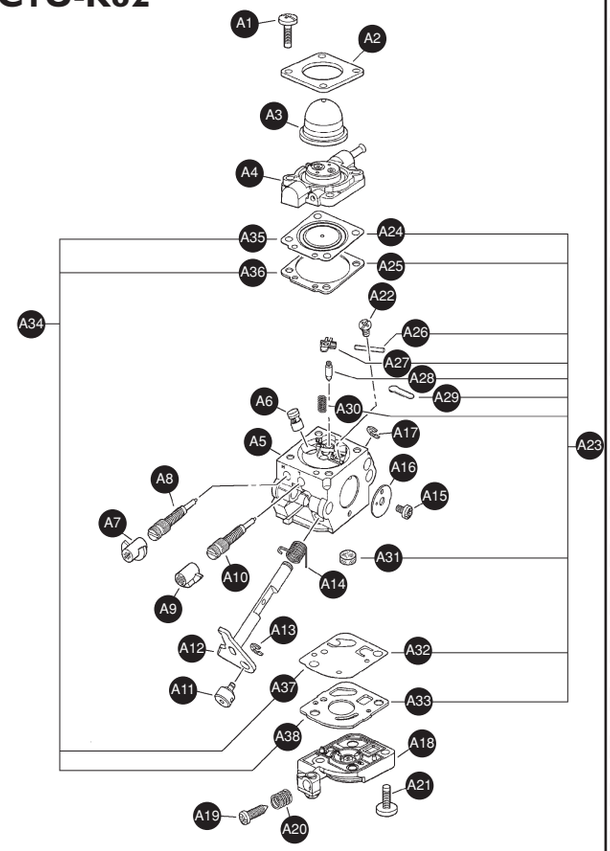


Key No.	Part No.	Description	Qty.
1	300101	Handle	1
2	300103	Grip (Set)	1
3	300117	Switch Plate	1
4	300122	Trigger Set	1
5	300108	Trigger \ Lockout Springs	1
7	300110	Switch/With Leads	1
8	973	10-32 Lock Nut	1
9	300116	Conduit	1
10	300902	Engine	1
11	300503	10-32 x 1 1/4" Machine Screw	1
12	972	1/4-20 Lock Nut	2
13	300102	Handle Support Channel	1
14	300113	Spacer	2
15	300111	Shock Absorber	4
16	300112	Support Plate	1
17	300505	1/4-20 x 2 1/2" Bolt	2
18	4079	6MM Star Lock Washer	2
19	4078	6MM Nut	2
20	300115	Throttle Cable	1
21	300000	Gear Housing Assembly	1
22	300511	7/8" Phillips Pan Head Screw	4
23	300109	Switch Cap	1
24	300118	Cable Tie	1
25	376-1	Handle End Cap	1



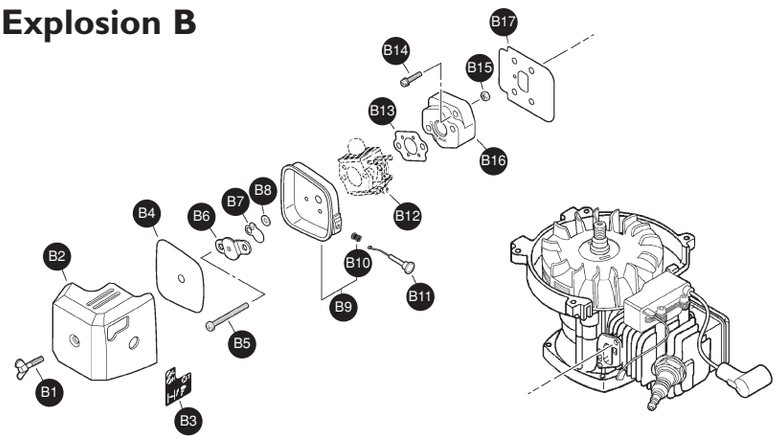
D. SV-5H/2 Engine Parts Assemblies

Carburetor – C1U-K82
Explosion A



ITEM	PART #	QTY.	DESCRIPTION / REMARKS
A1	P005000980	4	SCREW, PURGE BASE
A2	P005000620	1	RETAINER, PURGE BULB
A3	12538108660	1	BULB, PURGE
A4	P005000970	1	BASE, PURGE
A5	----------	1	BODY, CARBURETOR / NOT AVAILABLE SEPARATELY
A6	12537613120	1	NOZZLE, CHECK VALVE
A7	12532939030	1	CAP, LIMITER - HIGH SPEED -- RED
A8	12532013310	1	NEEDLE - HIGH SPEED
A9	12532909860	1	CAP, LIMITER - LOW SPEED -- WHITE
A10	12531813120	1	NEEDLE - LOW SPEED
A11	12537242030	1	SWIVEL
A12	P005001070	1	SHAFT, THROTTLE
A13	12532713930	1	CLIP, SWIVEL
A14	12531342030	1	SPRING, THROTTLE RETURN
A15	12531413930	1	SCREW, THROTTLE VALVE
A16	12531649030	1	VALVE, THROTTLE
A17	12532715130	1	CLIP, THROTTLE SHAFT
A18	12532412820	1	COVER, FUEL PUMP
A19	12533406960	1	SCREW, IDLE ADJUST
A20	12533306960	1	SPRING, IDLE ADJUST
A21	12531012820	2	SCREW, FUEL PUMP COVER
A22	12533942030	1	SCREW, METERING LEVER PIN
A23	12530013120	1	REPAIR KIT / INCLUDES ITEMS 24-33
A24	----------	1	DIAPHRAGM, METERING
A25	----------	1	GASKET, METERING DIAPHRAGM
A26	----------	1	PIN, METERING LEVER
A27	----------	1	LEVER, METERING
A28	----------	1	VALVE, INLET NEEDLE
A29	----------	1	WELCH PLUG
A30	----------	1	SPRING, METERING LEVER
A31	----------	1	STRAINER
A32	----------	1	DIAPHRAGM, FUEL PUMP
A33	----------	1	GASKET, FUEL PUMP
A34	12530313120	1	GASKET/DIAPHRAGM KIT / INCLUDES ITEMS 35-38
A35	----------	1	DIAPHRAGM, METERING
A36	----------	1	GASKET, METERING DIAPHRAGM
A37	----------	1	DIAPHRAGM, FUEL PUMP
A38	----------	1	GASKET, FUEL PUMP

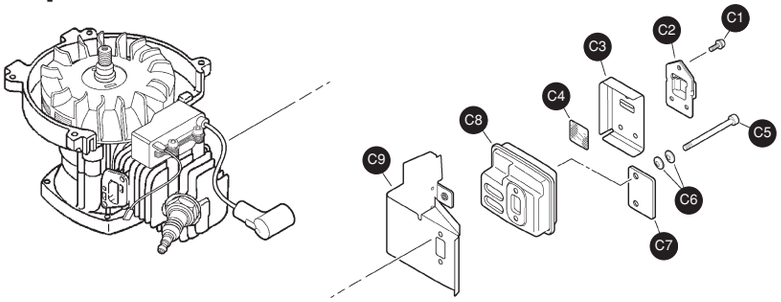
Air Cleaner
Explosion B



ITEM	PART #	QTY.	DESCRIPTION / REMARKS
B1	90052800005	1	WING BOLT
B2	13032611522	1	COVER, AIR CLEANER
B3	89012147530	1	LABEL, CHOKE
B4	13031004560	1	FILTER, AIR
B5	90024205057	2	SCREW 5X57
B6	13041005360	1	PLATE, PREVENT
B7	17851504560	1	SHUTTER, CHOKE
B8	17851600830	1	SPACER
B9	13030104560	1	CASE, AIR CLEANER / INCLUDES ITEM 10
B10	17881005230	1	GROMMET
B11	17851004560	1	ROD, CHOKE
B12	----------	1	CARBURETOR
B13	13001642031	1	GASKET, INTAKE[1]
B14	90023805020	2	SCREW 5X20 / SEE CARBURETOR DIAGRAM FOR ADDITIONAL INFORMATION
B15	90050000005	2	NUT 5
B16	13001742031	1	INSULATOR
B17	V103000490	1	SHIELD, INTAKE[1]

[1] ALSO INCLUDED IN GASKET KIT (PAGE 19)

Muffler
Explosion C



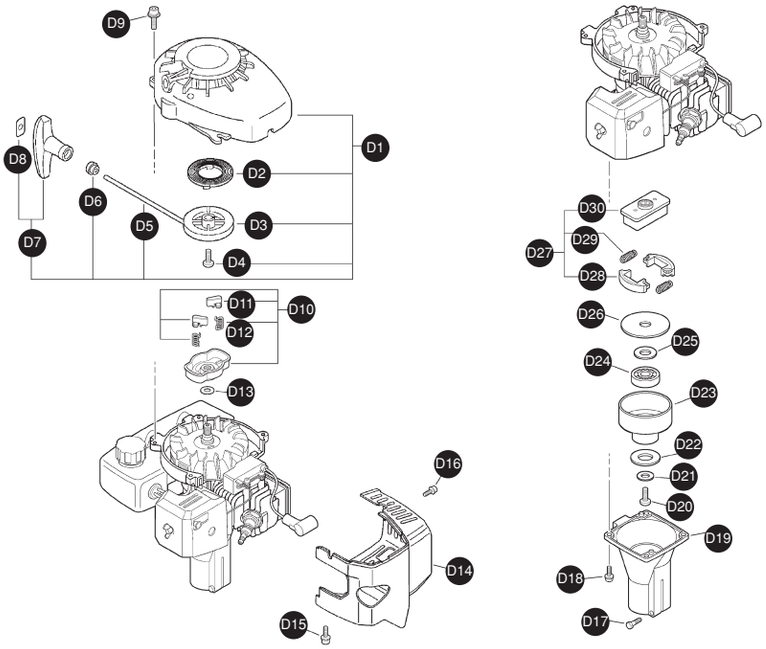
ITEM	PART #	QTY.	DESCRIPTION / REMARKS
C1	9136704012	3	SCREW 4X12
C2	A313000700	1	GUIDE, EXHAUST
C3	V104000072	1	GASKET, EXHAUST[1]
C4	14586240630	1	SCREEN, MUFFLER
C5	90010505055	2	SCREW 5X55
C6	V347000000	4	WASHER, CONICAL
C7	V150000371	1	EYE PLATE
C8	A300000521	1	MUFFLER
C9	V104000590	1	SHIELD, EXHAUST[1]

[1] ALSO INCLUDED IN GASKET KIT (PAGE 19)

SV-5H/2 Engine Parts

Engine Cover, Fancase, Starter, Clutch Case & Clutch

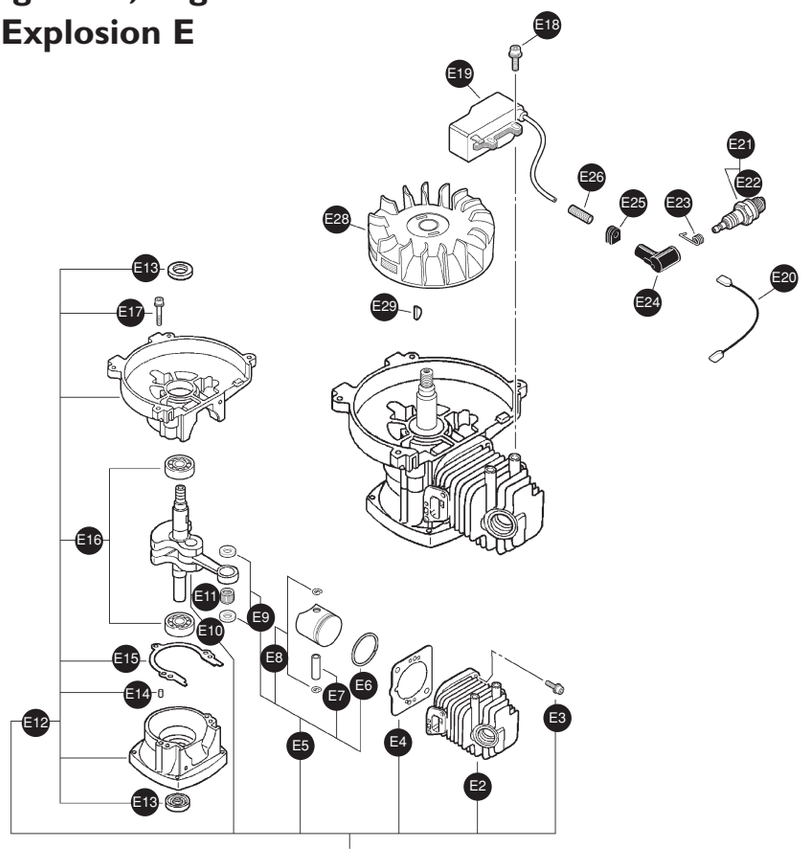
Explosion D



ITEM	PART #	QTY.	DESCRIPTION / REMARKS
D1	A051000950	1	STARTER ASY / INCLUDES ITEMS 2-8
D2	17722042030	1	SPRING, REWIND
D3	17721544430	1	DRUM, STARTER
D4	17723644330	1	SCREW
D5	17722605530	1	ROPE, STARTER - 3X890MM / REPOWER BULK OPTION: 99944440000
D6	17722742030	1	GUIDE, ROPE
D7	17722811120	1	STARTER GRIP KIT / INCLUDES ITEM 8
D8	17724611120	1	CLIP, STARTER ROPE
D9	90023804016	4	SCREW 4X16
D10	17720212220	1	STARTER PAWL ASY / INCLUDES ITEMS 11-12
D11	17721844330	2	PAWL, STARTER
D12	17723412220	2	SPRING, RETURN
D13	90060500008	1	SPRING WASHER 8
D14	A160000610	1	COVER, ENGINE
D15	90023804018	2	SCREW 4X18
D16	9110704008	1	SCREW 4X8
D17	13041611520	1	BOLT 5X25
D18	90023804018	4	SCREW 4X18
D19	61022311520	1	CASE, CLUTCH
D20	90023806012	1	SCREW 6X12
D21	17501411520	1	WASHER, CLUTCH
D22	17504404630	1	WASHER, CLUTCH
D23	17501004635	1	DRUM, CLUTCH
D24	90080836000	1	BEARING, BALL
D25	90060000010	1	WASHER 10
D26	17501904630	1	PLATE, CLUTCH
D27	17500007531	1	CLUTCH/ASY / INCLUDES ITEMS 12-14
D28	17500905131	2	SHOE, CLUTCH
D29	17501805130	2	SPRING, CLUTCH
D30	17501605020	1	HUB, CLUTCH

Ignition, Engine & Short Block

Explosion E



ITEM	PART #	QTY.	DESCRIPTION / REMARKS
E2	A130000550	1	CYLINDER
E3	90016205022	2	SCREW 5X22
E4	V100000160	1	GASKET, CYLINDER[1]
E5	P021007712	1	PISTON KIT / INCLUDES ITEMS 6-9
E6	A101000090	1	RING, PISTON
E7	10001311520	1	PIN, PISTON
E8	10001504630	2	CIRCLIP, PISTON PIN
E9	10001411520	2	SPACER, PISTON PIN
E10	A01100-0441	1	CRANKSHAFT ASY / INCLUDES ITEM 11
E11	100204-1152 1	1	BEARING, NEEDLE
E12	10020411521	1	CRANKCASE KIT / INCLUDES ITEMS 13-17
E13	10021242031	2	OIL SEAL
E14	V622000020	2	DOWEL PIN - 4X7.8MM
E15	10024242030	1	GASKET, CRANKCASE[1]
E16	9403536201	2	BEARING, BALL - 6201
E17	90016205028	3	SCREW 5X28
E18	9111304020	2	SCREW 4X20
E19	A411000220	1	COIL, IGNITION
E20	16202152830	1	LEAD, IGNITION
E21	15901019830	1	SPARK PLUG -- BPM-8Y
E22	A425000000	1	SPARK PLUG -- BPMR-8Y[2]
E23	15901103432	1	TERMINAL, SPARK PLUG
E24	15901201620	1	CAP, SPARK PLUG
E25	15611004920	1	BUSHING
E26	V475002200	1	TUBE, INSULATOR
E27	A409000150	1	FLYWHEEL
E28	61032502730	1	WOODRUFF KEY

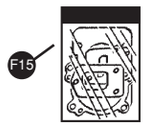
[1] ALSO INCLUDED IN GASKET KIT (PAGE 19)

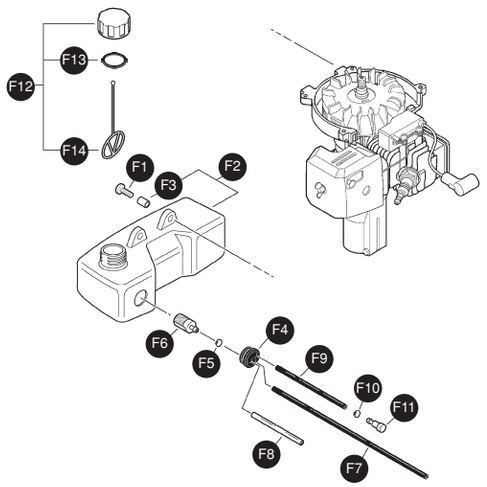
[2] CANADA MODELS

SV-5H/2 ENGINE PARTS

Fuel System
Explosion F

GASKET KIT





ITEM	PART #	QTY.	DESCRIPTION / REMARKS
F1	90027505015	3	SCREW 5X15
F2	A350000300	1	TANK, FUEL / INCLUDES ITEM 3
F3	13104528230	3	SPACER
F4	V137000030	1	GROMMET
F5	13201309820	1	CLIP
F6	13120507320	1	FILTER, FUEL
F7	V471001230	1	PIPE, FUEL - 3X5X210MM / BULK OPTION: 90014
F8	13201049030	1	PIPE, RETURN - 3X6X50MM / BULK OPTION: 90017
F9	V471001200	1	PIPE, VENT - 3X5X70MM / BULK OPTION: 90014
F10	13011100530	1	CLIP, PIPE
F11	A356000030	1	VENT ASY
F12	13100409060	1	CAP ASY / INCLUDES ITEM 13-14
F13	13101655830	1	GASKET, CAP
F14	13105156030	1	CONNECTOR, CAP
F15	P021009110	1	GASKET KIT

ECHO INCORPORATED EMISSION CONTROL WARRANTY STATEMENT

FOR ECHO AND SHINDAIWA BRANDS

The Environmental Protection Agency (EPA) and the California Air Resources Board (C.A.R.B.) and ECHO Incorporated (ECHO Inc.) are pleased to explain the emission control system warranty on your 2010 and later equipment/small off-road engine (SORE). New equipment/SORE must be designed, built and equipped to meet stringent EPA and C.A.R.B. anti-smog standards. ECHO Inc. must warrant the emission control system on your equipment/SORE for the periods of time listed below, provided there has been no abuse, neglect or improper maintenance of your equipment/SORE. Your emission control system may include parts such as: carburetor, fuel-injection system, ignition system, catalytic converter/muffler, fuel tank, fuel feed lines, fuel cap assembly, spark plug, air filters, and other associated components. Where a warrantable condition exists, ECHO Inc will repair your equipment/SORE at no cost to you including diagnosis, parts and labor. The Emission Control System warranty is extended to the original owner including all subsequent owners.

MANUFACTURER'S WARRANTY COVERAGE:

The emission control system is warranted for 2 years or the length of the ECHO Inc. warranty, whichever is longer. If any emission-related part on your equipment is defective, the part will be repaired or replaced by ECHO Inc. or its Authorized Service Representative.

OWNER'S WARRANTY RESPONSIBILITIES:

As the equipment/SORE owner, you are responsible for the performance of the required maintenance listed in your Operator's Manual. ECHO Inc. recommends that you retain all receipts covering maintenance on your equipment/SORE however, ECHO Inc. cannot deny warranty solely for the lack of receipts or for your failure to ensure the performance of all scheduled maintenance. As the equipment/SORE owner, you should be aware that ECHO Inc. may deny you warranty coverage if your equipment/SORE or a part has failed due to abuse, neglect, improper maintenance or unapproved modifications.

You are responsible for presenting your equipment/SORE to an ECHO Inc. authorized service representative as soon as a problem exists. The warranty repairs should be completed in a reasonable amount of time, not to exceed 30 days. If a warrantable condition exists and there is no Authorized Dealer within 100 miles, ECHO Inc. will pay to ship the unit to the nearest authorized dealer. If you have questions regarding your warranty coverage, you should contact ECHO Inc. at 1-800-673-1558, web site WWW.ECHO-USA.COM or contact Shindaiwa at 1-877-986-7783, web site WWW.SHINDAIWA.COM.

WHAT DOES THIS WARRANTY COVER?

ECHO Inc. warrants that your equipment/SORE was designed, built and equipped to conform with applicable EPA and C.A.R.B. emissions standards and that your equipment/SORE is free from defects in material and workmanship that would cause it to fail to conform with applicable requirements for 2 years or the length of the ECHO Inc. warranty, whichever is longer. The warranty period begins on the date the product is purchased by an end user..

HOW WILL A COVERED PART BE CORRECTED?

If there is a defect in a part covered by this warranty, any ECHO Inc. Authorized Service Dealer will correct the defect. You will not have to pay anything to have the part adjusted, repaired or replaced. This includes any labor and diagnosis for warranted repairs performed by the dealer. In addition, engine parts not expressly covered under this warranty but whose failure is a result of a failure of a covered part will be warranted.

WHAT PARTS ARE COVERED?

- Any applicable emission related part not scheduled for "required maintenance" will be repaired or replaced within the warranty period. The repaired or replaced part will be warranted for the remaining ECHO Inc. warranty period.

Continued

- Any warranted part that is scheduled only for regular inspection in the written instructions supplied is warranted for the warranty period stated above. Any such part repaired or replaced under warranty will be warranted for the remaining ECHO Inc. warranty period.
- Any emission related part scheduled for replacement during "required maintenance" is warranted for the period of time prior to the first scheduled replacement point for that part. Any such part repaired or replaced under warranty shall be warranted for the remainder of the period prior to the first scheduled replacement point for that part.
- Any manufacturer-approved replacement part may be used in the performance of any warranty maintenance or repairs on emission related parts, and must be provided without charge if the part is still under warranty.
- Any replacement part that is equivalent in performance and durability may be used in non-warranty maintenance or repairs, and shall not reduce the warranty obligations of the manufacturer.
- Throughout the equipment/SORE warranty period, ECHO Inc. will maintain a supply of warranted parts sufficient to meet the expected demand for such parts.

SPECIFIC EMISSION RELATED WARRANTED PARTS:

- Electronic Ignition System
- Catalytic Converter / Muffler Assembly
- Choke
- Fuel Tank
- Air Filter
- Spark Plug
- Carburetor (complete assembly or replaceable components)
- Fuel-Injection Assembly (or replaceable components)
- Fuel Cap Assembly
- Fuel Feed Line (and associated clamps/connectors as applicable)

WHAT IS NOT COVERED?

Any failure caused by abuse, neglect, improper maintenance, unapproved modifications, use of unapproved add-on parts/modified parts or unapproved accessories.

This Emission Control Warranty is valid only for the U.S.A., it's Territories, and Canada. 99922201033 01/2010

MANTIS HEDGE TRIMMER LIMITED WARRANTY

5 YEAR LIMITED SERVICE & WARRANTY POLICY FOR GASOLINE HEDGE TRIMMERS

All ***Mantis*** Gasoline Hedge Trimmers are guaranteed against defects in material and workmanship for a period of FIVE YEARS from date of purchase, when used for RESIDENTIAL SERVICE, or COMMERCIAL SERVICE. Any ***Mantis*** Gasoline Hedge Trimmer or part found to be defective within the warranty period is to be returned to any registered Mantis Dealer.

Engines for all gasoline powered products are warranted separately by the engine manufacture for a period of a year. Therefore, there are no warranties made, expressed or implied, for engines for gasoline powered products by ***Mantis***.

Transportation charges for parts and units submitted for replacement under this warranty must be borne by the purchaser.

THIS WARRANTY shall not be effective if the product has been subject to misuse, negligence or accident, used in cutting hedges or shrubs greater than 1" in diameter, used to cut foreign objects such as wire, rocks, or fences, or if the product has been repaired or altered outside of our Southampton factory in any respect which affects its condition or operation.

Mantis shall not be liable for any special indirect or consequential damages arising from defective equipment. Any implied warranty, including merchantability of fitness for a particular purpose, shall not extend beyond the written warranty period.

THIS WARRANTY shall only be effective if the enclosed Warranty/Registration card is properly filled out and returned to ***Mantis***, Div. of Schiller-Pfeiffer, Inc. at time of purchase.

Specifications, descriptions, and illustrative material in this literature are as accurate as known at the time of publication, but are subject to change without notice.

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P/N 320709 7/10
Printed in USA